The JOURNAL *of* GEOGRAPHY

Copyright 1942, by the National Council of Geography Teachers

VOLUME XLI NOVEMBER, 1942 NUMBER 8

THE MONONGAHELA RIVER AND ITS STATEGIC IMPORTANCE

J. RILEY STAATS
State Teachers College
California, Pennsylvania

The Monongahela River, known to the Indians as the "River of Falling Banks," is one of the important commercial highways of the nation, and is an important life line for the vital war industries of western Pennsylvania, northern West Virginia, and northeastern Ohio, a region that produces over half of the nation's steel. "It has been said that the First World War was won on the Monongahela River, because that waterway afforded facilities for the shipment of raw materials for weapons which overcame the Germans on the battlefields of France. While railroads were the backbone of our transportation system during the First World War, as they are today, new forms of transportation have been improved to the point where they materially supplement the railroads, especially during periods of traffic strain."[1] In fact, this river, during periods of greatest activity, is exceeded in cargo tonnage only by the Rhine, and probably the Yangtze. Not until the last decade has the maximum tonnage shipped on the Monongahela been exceeded by that of the Panama or Suez Canals.

The junction of the Tygart and West Fork rivers, a mile south of Fairmont, West Virginia, forms the Monongahela, and from this point the river flows for 128 miles in a northerly, tortuous course among wooded hills, rocky cliffs and rolling farmlands of West Virginia and Pennsylvania to Pittsburgh; there it joins the Allegheny to form the Ohio (Fig. 1). The Monongahela drains some 7,384 square miles of hill country of precipitous slopes in which only a small percentage of land is under cultivation; but much of the basin has been denuded of its cover of virgin forests, a condition that has added to the danger of floods.

[1] Lyons, Thomas E., Domestic Commerce Report, September 25, 1941.

Thruout its course, the Monongahela is incised deeply into horizontal or slightly dipping strata of Carboniferous age. In many places the river and its tributaries have cut below coal seams of this strata, and in such places coal outcrops occur along its banks. Slope mines, starting from the river's edge and extending from a few to more than twenty miles back under the hills, are common features

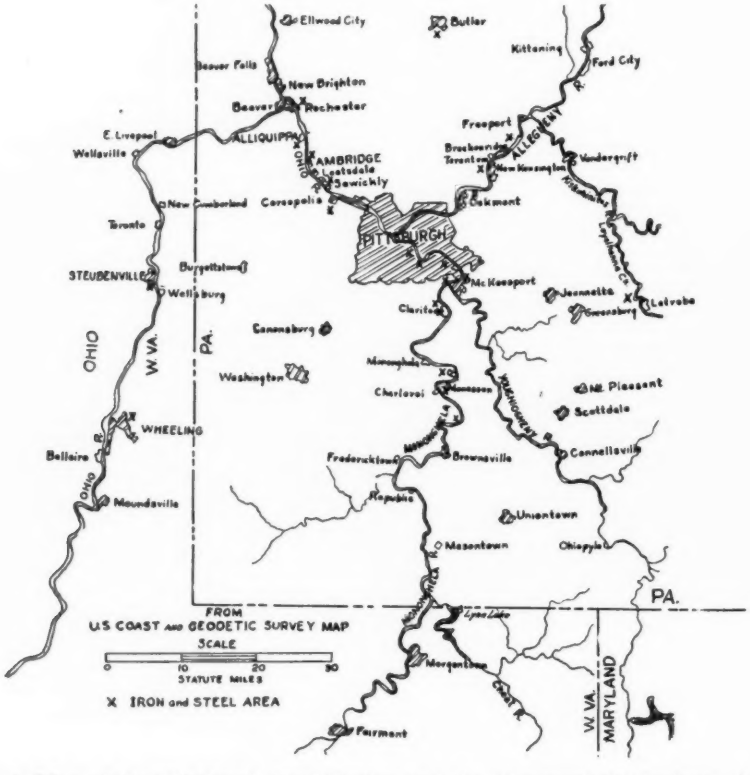

Fig. 1. Map of the Pittsburgh Steel Region and the Monongahela Drainage Area.

thruout its length. Tipples (Fig. 2) in connection with some of these mines extend out over the water's edge, and afford an easy means of transferring coal from the mines to river barges; thence by water to large industrial plants, some of them requiring as much as 30,000 tons of coal each day, which occupy all available bank space (Fig. 3) along the lower portions of the river. A great number of these plants rely entirely upon the river for transporting their supply of fuel. Some of the tipples that transfer coal directly to the barges are fed by a system of underground, endless con-

veyors, which enable companies to load a barge of 800 tons in a period of 7 to 8 minutes. Other tipples are used to transfer coal from the mines to railway cars without any elevating being necessary. The latter transportation facilities are moved over double tracks that are located on both sides of the river.

The Monongahela passes thru the heart of the nation's coal mining, coke making, and iron and steel producing region. Sheer, rocky, crumbling cliffs rise abruptly from 250 to 400 feet above the

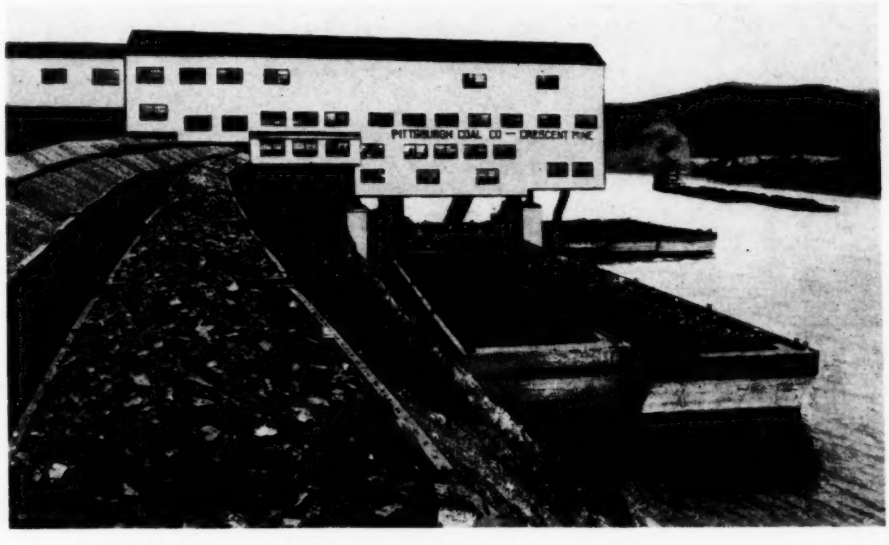

Fig. 2. Tipple of Pittsburgh Coal Company at their Crescent Mine. Courtesy of Pittsburgh Press.

river on the outside of the meanders, while on the inside are flat terraces and slip-off slopes of varying sizes, which are either crowded with industry, or form the sites for urban agglomerations. The industrial scene embraces rows of tall stacks belching fiery smoke from blast furnaces, coke ovens, and zinc and steel mills (Fig. 3), each in a setting of rusty red heaps of iron ore, piles of yellow sulphur, rows and rows of pigs, and mounds of coke and limestone. In the lower half of the river's course, this variety of industrial concerns make an almost continuous urban development; in the upper half, coal tipples, railroad and storage yards characterize the industrial phase of the valley.

Urban centers are interspersed at frequent intervals in the industrial landscape of the valley. In the larger ones wholesale

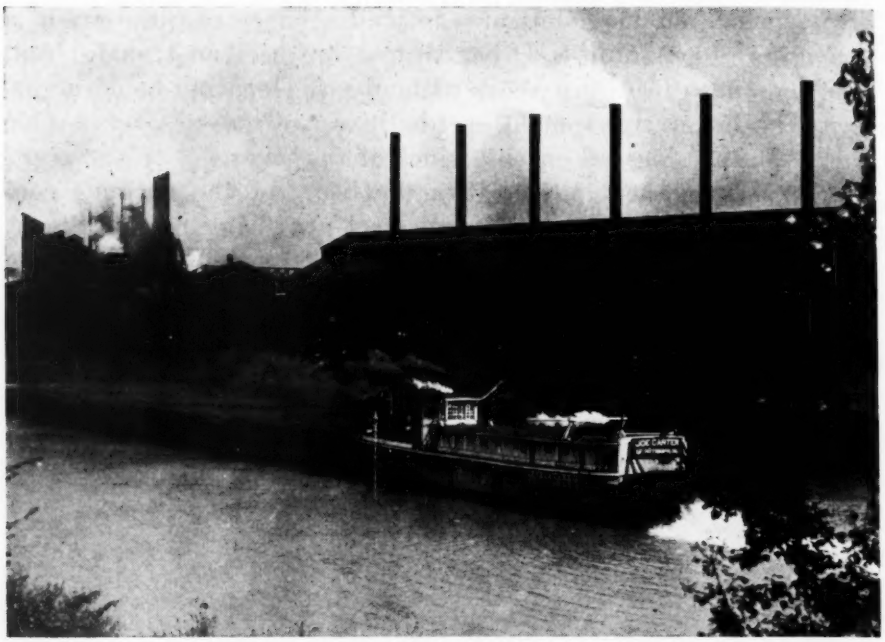

Fig. 3. Tow of coal and a portion of the Pittsburgh Steel Company Plant at Monessen, Pennsylvania. Courtesy of Pittsburgh Steel Company.

and retail establishments are separated by extremely narrow streets from residential sections which have spread up the valley walls in tier upon tier to the general level of the upland area (Fig. 4); the smaller urban sites, which are less favorably connected with their hinterlands, and generally smaller in extent, are crowded with houses monotonously alike in their general architecture and unkempt appearance.

THE EARLY MONONGAHELA

During the early period of occupancy by Indians, and later by frontier settlers, this stream was as vital a factor in their lives as it is in our present set-up. Canoes of the Indians moved noiselessly on its surface, and scows were poled along its course, carrying the Indian to his destination, the pioneer's family and possessions to his new home, or the surplus of his small farm to market. The river was probably more important as a highway during this stage since roads or railroads were unknown. The arrival of the steamboat was an event that attracted many people of the village to the dock, there to await the arrival of merchandise, to send produce

to market, to meet friends, or just to come in contact with others from beyond their own limited community.

The use of the stream during this early stage was interrupted by fluctuations in its flow. During the time of full-flow packets plied between Pittsburgh and Brownsville and New Geneva, as well as intermediate points; wooden rafts and flat-bottomed boats and scows were poled thruout its course, or permitted to float with the

Fig. 4. A view of Brownsville, Pennsylvania, a medium sized urban area of the Monongahela Valley.

current. Then as summer drought caused shallow depth, the packets were tied up along the Monongahela wharf at Pittsburgh or elsewhere along the course of the river, and rafts and scows were no longer able to operate. With the coming of the fall rains and an increased depth of water the cry, "Water's coming," was the signal for the resumption of traffic. Coal from seams outcropping along the river's course, produce from adjacent farms, and goods from the industrial establishments, started moving to Pittsburgh and points beyond via the Monongahela, Ohio and Mississippi waterway.

In 1844 canalization was completed from Pittsburgh to Brownsville, and after the completion of this slack water navigation, a transportation company was organized to carry passengers and freight between these and intermediate points. In the first eight years of its operation, 1844 to 1852, 200,000 persons transferred from stage coach to steamboat at Brownsville, Pennsylvania, where the National Pike crossed the Monongahela, to continue their journey west. Freight and passengers were ticketed thru from Balti-

more to Pittsburgh by this stage and water route.

The first dams were constructed with a lift of only four feet in order that they would not interfere too much with rafts that were floated down stream. This compromise tended to end the feud between those in favor and those opposed to canalization, a feud that held up the permit for canalization from the first survey in 1837 until 1844 when the first portion was completed. The Navigation Company passed out of existence in 1897 when its rights were purchased by the United States government.

The early packets on the Monongahela were wooden boats that had an average length of 79 feet and a beam of 40 to 50 feet. They were as large as the locks permitted, and were driven by two wheels, one on each side; later stern wheelers, similar to those used today, replaced them. Boat building establishments were common industrial features thruout the course of the river during the last half of the nineteenth century, an industry that is centered today on the Ohio just below the junction of the Monongahela and the Allegheny rivers.

THE MONONGAHELA TODAY

The Monongahela is divided into 14 basins by 15 dams to regulate the flow and to maintain a depth of 7 to 9 feet. A depth of 9 feet is maintained to Lock Number 10, and above that point, a depth of 7 feet is maintained to Fairmont, West Virginia. The period of navigation varies somewhat from year to year since the stream is ice-bound for a few weeks during the winter of some years—in 1938, according to the Army Engineers Report of that year, the navigation season was 348 days—and high waters may interfere for a few days some years.

There was a lockage charge of three cents a ton during the period the Navigation Company was in control, but today under Federal control there is no toll of any kind. The maintainance of the locks, the dredging of basins, salaries of lockmasters and engineers, and all other expenses connected with the maintenance of this inland waterway are paid by the Federal government. This makes it possible to transport coal by water to the Pittsburgh district from mines 45 to 50 miles distant at a total cost of 9 to 11 cents a ton, or less than 2.4 mills a ton mile. For the same distance the cost by rail is approximately $1.80 a ton, or about 4 cents a ton mile, a cost of more than 16 times that of transportation by water.

The importance of the Monongahela River as an inland water-

way becomes evident when one examines the tonnage carried on this stream during any year, or period of years, and compares this tonnage with that of other waterways. The following figures from the Transportation Division of the Bureau of Foreign and Domestic Commerce, and from Reports of Army Engineers show the comparative cargo tonnages of several waterways:

	1930	1934	1935	1936
Rhine	60,700,000	61,200,000	64,810,000	71,700,000
Suez	28,511,000	31,751,000	32,810,968	32,279,000
Panama	30,030,232	24,718,650	25,309,527	26,505,943
Monongahela	25,746,653	14,397,462	18,068,184	24,927,507
Allegheny	3,180,596	2,946,590	3,355,865	3,424,403
Ohio	22,337,444	18,606,644	20,964,134	24,376,671

Analysis of the cargo carried on the Monongahela shows the importance of this waterway in getting coal to the by-product coke ovens and coke to the blast furnaces, an importance that is closely related to our defense industry. The following figures from the Army Engineers Report as submitted by the Pittsburgh office shows the relative importance of various commodities transported on the Monongahela:

Commodity	*Tonnage*
Coal	28,182,128
Coke	1,326,667
Sand and gravel	2,235,245
Iron and steel	1,602,991
Cement	47,510
Packet freight	42,954
Oil and gasoline	21,840
Stone	21,173
Logs and lumber	10,957
Other commodities	416,149
Total cargo tons	28,907,614

The tonnage on the Monongahela fluctuates in response to the demands of the steel mills and by-product coke ovens, since coal and coke make much the greater part of the tonnage carried on the stream. As business revived with our defense program the cargo tonnage showed a sharp rise as verified by the following cargo figures:

	1937	1940	1941
Cargo tonnage	24,394,621	29,258,184	31,104,821

The tonnage of 1941 would have filled 518,414 coal cars of 60

tons each, or would have been enough to make up a train of cars 3,900 miles long.

During good business years the Monongahela is a scene of great activity; barges are pushed down stream loaded with coal and coke, those going up stream are usually empty, or loaded with oil, cement, or gravel. As a result of the fluctuations in the tonnage the Monongahela may be thought of as a barometer that registers business conditions, as well as an important carrier of products for defense.

ILLUSTRATIVE MATERIALS FOR CONSERVATION EDUCATION. I. PICTURES, CHARTS AND POSTERS

W. H. HARTLEY
State College for Teachers
Towson, Maryland

The various aspects of the study of the conservation of our natural resources lend themselves peculiarly well to visual presentation. It is extremely difficult for the young pupil to comprehend, from a purely verbal description, the meaning and importance of such concepts as contour plowing, terracing, or the use of check-dams. Fortunately there is available a quantity of attractive, effective, and fairly inexpensive illustrative material which can be used to present conservational concepts in a realistic fashion. Among the many aids which may be utilized by the teacher are flat pictures, charts, graphs, posters, slides, transparencies, objects, specimens, models, maps, globes, cartoons, and motion pictures.

The large amount of picture material which may be obtained to illustrate the need for conservation and the steps being taken to meet this need, is overwhelming. Each issue of *Life, Look, Fortune, Building America, Scribners, National Geographic, Nature,* and similar magazines contain pictures which may be used to illustrate some phase of conservation. The alert teacher will build up over the years a collection of these pictures, carefully mounted, catalogued, and filed. Just a word about mounting. Use a good quality mounting paper of a neutral or contrasting shade, and affix the picture firmly but artistically with paper cement, scotch tape or dry mounting tissue (obtainable at any photographic supply shop).

Select a standard size mounting paper, 8 by 10 inches for standard size file, or 11 by 14 inches if you have a legal size file. Any picture worth keeping is worth mounting, and the best time to mount a picture is the minute you have discovered and clipped it. By making a practice of mounting all pictures of lasting value, a good usable collection may soon be built up which will have an attractive appearance as contrasted to the dog-eared, worn and torn pictures which too often disgrace our bulletin-boards. Start your students on the search for this type of material; it is a worth-while educational activity for them and the picture file will be *theirs*.

Another valuable source of pictures lies in the many excellent government publications which are available to schools free of charge or at low cost. Profusely illustrated, these pamphlets clarify ideas otherwise extremely difficult to grasp. In most instances it will pay to secure several copies of the better illustrated pamphlets. Keep one in the classroom library and clip and mount the pictures in the other pamphlet.

Another source of illustrative material is the commercial firms which provide classroom teachers with sets of pictures especially designed for school use. These pictures are usually reasonably priced and by judicious purchasing a useful supply of pictures may soon be obtained. Governmental agencies also provide sets of pictures under certain conditions. They are usually excellent.

What is the best way to use these pictures in teaching conservation? The answer to this question depends somewhat upon the local situation, the grade level, interest, background, and abilities of the pupils. Some of the ways in which picture collections have been used are: first, pass the pictures around, have the pupils examine them and then discuss the findings. A word of warning here may not be amiss. If pictures are passed around, have enough pictures on hand so that each pupil or each two pupils may have a picture to examine. Devote a part of the class period to this exercise. Don't try to carry on a class discussion while the pictures are being examined, or the class will be divided in its interest, and neither the discussion nor the examination will be satisfactory. While the pictures are being studied the teacher may walk about the room, quietly discussing with individual pupils the information to be found in the picture.

Another effective way of using pictures is to post them on the bulletin-board or use them as room decorations. Students should

always be held responsible for information contained in pictures so posted. A bulletin-board committee should be appointed to arrange the pictures, and to call attention to this material. The same pictures may be taken from the bulletin-board and displayed before the class. When a picture is too small for the class to see it from the front of the room it may be placed in the opaque projector and flashed on the screen for group discussion. A thoroly darkened room is necessary for efficient projection with opaque projectors.

There are many other uses which the teacher may make of pictorial material. Individual scrapbooks and classbooks may utilize such pictures. Students may use pictures to illustrate their floor-talks. The writer found that pictures could effectively be used to test the accuracy of the conservational ideas of the pupils. A number of large pictures, which could be seen clearly by each member of the class, were numbered and displayed around the room. A question was asked concerning each picture, and the pupils were tested according to their ability to recognize types of erosion, methods of checking erosion, flood control practices, and the like. The pupils seemed to enjoy this type of test and the results were very enlightening.

One difficulty in obtaining suitable pictures lies in the fact that they are scattered among a wide variety of sources. Tracking down the picture you want is not always easy. To aid the teacher in this task, the following list of sources has been compiled. From these agencies one may obtain material on our forests, soil, minerals, water resources, and wildlife. In each instance a brief annotation calls attention to the type of material available from each source, its general nature, and the terms under which it may be acquired. Inclusion in this list does not necessarily imply approval, nor does omission imply condemnation.

PICTURES—COMMERCIAL SOURCES

Artex Prints, Westport, Conn.

Color Reproductions. Direct color reproductions of art masterpieces. A few, not many, suitable for illustrating the beauties of nature. Artex Prints 7 by 9 inches, 50 cents; 10 by 12, 80 cents; postcards 4 by 6, 10 cents each. Artex Junior prints 3 by 4 inches, $2.00 per hundred.

Creative Education Society, Mankato, Minn.

Visualized Curriculum Series. 8½ by 11 inches. Teaching pictures with text and questions on the back. With teacher's manual, $10.00 per set. Excellent. Problem 6—"Conservation—Human Resources." 92 pictures. Problem 7—"Conservation—Natural Resources." 119 pictures.

Joseph H. Dodson, Inc., Kankakee, Ill.

Bird and Nature Pictures. Full color. 7 by 9 inches, 3 cents each. Selection of over 1,000 prints.

Industrial Pictures. Size 6 by 9 inches. "Lumbering," 12 pictures, 25 cents. "Paper," 20 pictures, 50 cents.

Geo-Aero-Photo, P. O. Box 750, Oklahoma City, Okla.

Third Dimensional Aerial Photos. Complete with spectacles. Set of ten views of geologic and geographic features of the west, $5.00 per set.

General Electric Co., Publicity Dept., Schenectady, N.Y.

Production and Uses of Electricity. 15 by 10½ inch colored pictures, free. "Conserving our Natural Resources," "Bringing water to the Thirsty Soil," "Colorado Aqueduct."

Informative Classroom Picture Publishers, 48 North Division Ave., Grand Rapids, Mich.

The Farm. A series of 21 black and white drawings, each 8½ by 11 inches, showing types of farms and farm activities. Pictures and accompanying text are designed for early elementary grades. Price $2.80 per set.

Liberty Bell Bird Club, Washington Square Farm Journal, Philadelphia, Pa.

Bird Pictures. Five 7 by 9 inch pictures to the set, 10 cents per set.

National Association of Audubon Societies, 1006 Fifth Ave., New York, N.Y.

Bird Cards. Write for full list. Also bird charts. National Geographic Society, School Service Dept., Washington, D.C.

Separate Color Sheets. Color sheets identical with those bound in certain back numbers of the *National Geographic Magazine.* Ninety-six sheets will be furnished, postage prepaid, for 50 cents. Purchase price must accompany order. Illustrations are on both sides of the sheet. Write for a list of the pictures available.

Back Issues of National Geographic Magazine. Limited number available for educational use. Ten for $1.00, post paid.

Pictures for Wall Display. "The Oldest Living Thing" (General Sherman Tree in Sequoia Park), green gravure, 9⅜ by 23 inches; "Hark" (Wild Buck), woodland sepia, 11¾ by 8⅛ inches; "Doe and Twin Fawns", woodland sepia, 11¾ by 8⅛ inches, 50 cents each. "The Land, the Water, the Air," set of 48 pictures with accompanying text, each 9 by 11 inches, 50 cents per set.

A. J. Nystrom and Co., 33333 Elston Ave., Chicago, Ill.

Atwood Pictures. Sixteen pictures, each 20 by 15 inches, showing natural regions and man's activities in relation to them. Earth's surface divided into four natural regions: rugged mountains, worn-down mountains, uplands, lowlands. Complete set, mounted one on each side of eight durable cardboard panels, $8.00.

Fairgrieve Geography Pictures. Each picture 6 by 4 inches. Printed in gravure on one side of sheet, two pictures to a sheet, 8½ by 11. Set of 64 pictures, 75 cents. Postage 15 cents.

F. A. Owens Publishing Co., Dansville, N.Y.

Illustrated Units. Based on the illustrated units which have appeared in *The Instructor* magazine. Unit consists of an eight page pamphlet of text material, and a picture folio, size 12¾ by 9¾ inches. Picture pages have no printed material on the back so they may be mounted, cut out, and displayed. Price 25 cents each for four units or more, 30 cents each for four units or more, No. 3, "Animals"; No. 32, "Birds"; No. 13, "Fishing"; No. 47, "National Parks"; No. 16, "Natural Resources"; No. 5, "Rocks and Minerals"; No. 28, "Sea Creatures"; No. 9, "Trees"; No. 36, "Wild Flowers."

Perry Pictures Co., Malden, Mass.

Pictures of Forest Trees. Three sets of pictures, each 9 by 12 inches. Eight sheets to a set. Each sheet has a picture of the tree, a section of the trunk, and a spray of leaves. 50 cents per set.

Birds, Animals, and Minerals in Natural Colors. A selection of about 500 pictures, each 7 by 9 inches. Three cents each for twenty or more.

Wild Flower Preservation Society Inc., 3740 Oliver St., Washington, D.C.

Wild Flower Color Plates. Post cards, set of twelve 27 cents. Drawings 6 by 9 inch for coloring, one cent each. Set of forty state flowers, 40 cents. Yellowstone Park wild flowers, twelve postcards, 25 cents.

Gummed Pictures. For notebooks or wall charts, 2 by 3 inches. Set of 64 spring and summer wild flowers, 55 cents; 48 trees, 80 cents; 72 common birds, 80 cents.

GOVERNMENT PICTURES

Chief Photographer, Soil Conservation Service, Washington, D.C.

Photographs. The Soil Conservation Service has a collection of over 85,000 pictures showing types of soil erosion, soil conservation practices, water conservation, flood control, land utilization, and wildlife conservation. Write for price list, or write to your Regional Office of the Soil Conservation Service for photographs available on loan. They are *excellent*.

Office of Information, U. S. Department of Agriculture, Washington, D.C.

Photographs. Reproductions of photographs which have been obtained in connection with the authorized work of the U. S. Department of Agriculture may be purchased from the department. All inquiries should be addressed to the bureau which issued the material from which reproductions are to be made. If issuing bureau is not known, write to the above address.

U. S. Department of the Interior, Grazing Service, P.O. Box 659, Salt Lake City, Utah.

Photographs. This office maintains a photographic file from which may be drawn pictures relating to the range livestock industry. Send specific request.

Office of Plant and Operations, U. S. Department of Agriculture, Washington, D.C.

Aerial Photographic Reproductions. The Agricultural Adjustment Administration, Forest Service, and Soil Conservation Service have aerial photographic laboratories which may furnish reproductions subject to certain exceptions and restrictions. Orders may be taken by County Agricultural Conservation Associations, and local offices of the Forest Service, and Soil Conservation Service. If your local office cannot supply the picture write to the above address.

POSTERS AND CHARTS

The American Forestry Association, Washington, D.C.

"Six Rules for Preventing Fires in the Forest." Free.

Chicago Apparatus Co., 1735 North Ashland Ave., Chicago, Ill.

Visual Rock and Mineral Sets. Specimens mounted on 14 and 27 inch corrugated board. Complete with information about each rock and man's dependence upon it.

No. 24868 "Visual Rock Charts." Five in set, $29.75.

No. 24867 "Standard Rock Chart." Four in set, $15.00.

The Forest Service, U. S. Department of Agriculture, Washington, D.C.

Posters. In color. Free. "How a Tree Grows," "Yours in Trust," "Your Forests," "Your Fault, Your Loss."

General Biological Supply House, 761-763 East 69th Place, Chicago, Ill.

390D30 "Audubon Bird Charts." Four charts, each with pictures of our most common birds. Each $2.50.

390D70 "Nieland Tree Chart." Two disks attached together, spin upper disk to find principle facts about common trees. Each $1.00.

WC 63 "Wheat Rust." Complete Life History. Size 30 by 40 inches, $1.50.

Museum Extension Project, Works Progress Administration, 69-71 Belmont Ave., Newark, N.J.

Charts. Pictorial charts of plant and animal life. Black and white, 30 by 40 inches, 50 cents each.

National Fertilizer Association, 616 Investment Bldg., Washington, D.C.

Charts. 20 charts on fertilizers and good farming. Free.

National Forum, 421 West 118th St., New York City; or 417 Dearborn St., Chicago, Ill.

Farm Problems Visualized. A pictorial chart for wall display, 70 cents each. Write for list of additional charts which are issued monthly. Posters are available at 40 cents each.

A. J. Nystrom Co., 33333 Elston Ave., Chicago, Ill.

Hughes Citizenship Charts. Hand mounted on muslin, 50 by 28 inches. Each $3.00 to $6.00 depending upon mounting.

HC 8 "Natural Resources"

HC 9 "Important Raw Materials Used in American Industries"

Pictorial Statistics, Inc., 142 Lexington Ave., New York, N.Y.

Pictorial Charts. Each 8½ by 11 inches, 20 cents each.

"Erosion and Production Per Acre"

"Extent of Erosion in U. S., 1492-1935"

"How Plant Foods Are Lost"

"Natural Resources, Leading Producing States"

"Role of Forests"

"Soil Losses Through Cultivation"

Soil Conservation Service, U. S. Department of Agriculture, Washington, D.C.

Conservation Charts. This series of charts was prepared by the Soil Conservation Service for educational purposes. *Free* distribution is restricted to schools and colleges. Address your requests to national headquarters or to the Regional Soil Conservation Office nearest you. Regional offices are located at Upper Derby, Pa.; Spartansburg, S.C.; Dayton, Ohio; Fort Worth, Tex.; Milwaukee, Wis.; Amarillo, Tex.; Lincoln, Neb.; Albuquerque, N.M.; Spokane, Wash.; Berkeley, Calif.

National Conservation Problems. Each 19 by 24 inches in size.

1. "Soil Erosion, Cause and Effect"
2. "Contour Farming for Soil and Water Conservation"
3. "Strip Cropping, An Erosion Control Practice"
4. "Terraces for Erosion Control"
5. "Cover Crops Protect Soil"
6. "Gully Control"
7. "Saving Soil and Water on Pasture Land"
8. "Trees and Shrubs for Erosion Control"
9. "Wildlife, A Safe Use for Erodible Land"
10. "Farm Ponds"

Regional Conservation Charts. Each 36 by 36 inches. Based on Soil Conservation Service program in upper Mississippi Region, including Iowa, Illinois, Missouri, Minnesota, and Wisconsin.

11. "Soil Management Program for Cropland"
12. "Effect of Cropping Plan on Soil Losses"
13. "Story of Three Corn Fields and the Soil They Lost Each Year"
14. "Improve Pastures, Safeguard Soil, Produce More Protein"
15. "Financial Insecurity Follows Erosion of Soil"
16. "Erosion Control Starts with an Inventory of Farm Resources"
17. "Soil Conservation Calls for Long Time Planning"

Regional Conservation Charts—Continued. This series of charts is based upon work in the Ohio Valley, including, Indiana, Kentucky, Michigan, Ohio, and Tennessee.

18. "Locust Reclaims Gullied Areas Within Three Growing Seasons"
19. "Contour Furrows"
20. "Winter Cover Saves Soil"
21. "Soil Erosion Destroyed This Community"

Regional Conservation Charts—Continued. This series of charts, each 19 by 24 inches, is based upon work done in the Southern Great Plains region, which includes the state of Kansas, the Panhandle areas of Oklahoma, and Texas, the extreme eastern section of New Mexico, and eastern Colorado.

22. "Wind Erosion in the Great Plains"
23. "Vegetative Cover for Wind Erosion"
24. "Water Conservation in the Great Plains"
25. "Conserving Range Lands of the Great Plains"

Regional Charts—Continued. The following charts are based on the Soil Conservation work in the Pacific Southwest region, which includes the States of California and Nevada.

26. "Hillside Orchards Need Cover to Protect Soil from Erosion"
27. "Trees Conserve Soil and Water"

Superintendent of Documents, Government Printing Office, Washington, D.C.

Educational Charts on Agriculture. Each 12 by 15 inches. Single charts 5 cents, 100 charts, $2.00.

7.70 "Furniture Woods"
7.77 "How Lumber May Be Cut"
8.10 "A Well-Planned Farm Food Supply"

Teaching Material Service, 205 East 42nd St., New York City

Forest Conservation and Harvard Forest Models. Chart 38 by 25 inches. Series of pictures on tree enemies, preservation of forests, and value of trees. Price 50 cents.

Tennessee Valley Authority, Knoxville, Tenn.

"Pictorial Profile of Tennessee Valley." Free.

U. S. Bureau of Reclamation, Washington, D.C.

Chart. "Boulder Dam and Power Plant." Size 10 by 8 inches.

Wild Flower Preservation Society Inc., 3740 Oliver St., Washington, D.C.

Posters.

"Holley, Laurel and Ground Pine," 10 cents each
"Leave the Dogwood for Others to Enjoy," 3 cents each
"Spare the Flowers," and "Outdoor Code," 2 for 5 cents
"Will You Help Protect Rare Wild Flowers?," 3 for 5 cents

Travel Posters

Note: Posters showing America's beauty spots, in color, may be obtained from the following sources. There is usually a charge for these posters, but this charge is sometimes waived if the posters are to be prominently displayed. Write to the listed sources concerning the available posters and the terms of their distribution.

Baltimore-Ohio Railroad, Baltimore, Md.
Bureau of State Publicity, Conservation Dept., Albany, N.Y.
Chamber of Commerce, Los Angeles, Calif.
Greater North Dakota Association, Fargo, N.D.
Minnesota Tourist Bureau, 349 State Office Bldg., St. Paul, Minn.
Mississippi Advertising Commission, Jackson, Miss.
Montanans Inc., Helena, Mont.
New Hampshire State Development Commission, 17 Capital, Concord, N.H.
New Mexico State Tourist Bureau, State Capital, Santa Fe, N.M.
North Carolina State Conservation Dept., Raleigh, N.C.

On-to-Oregon, Portland, Ore.
Southern Pacific Lines, San Francisco, Calif.
Southern Railway System, Passenger Traffic, Manager, Washington, D.C.
State of Michigan, Tourist Bureau, Lansing, Mich.
State of Tennessee Information Dept., 426 N. 6th Ave., Nashville, Tenn.
Vermont, Dept. of Conservation and Development, Montpelier, Vt.
Virginia State Conservation, State House, Richmond, Va.
Spokane Chamber of Commerce, Spokane, Wash.

Pictures and Charts from State Agencies

Note: The following agencies distribute materials suitable for school use to schools within the state boundaries. Write directly to the agency concerned for full particulars.

Arkansas Geological Survey, 447 State Capitol, Little Rock, Ark.
California State Division of Mines, Department of Natural Resources, Ferry Building, San Francisco, Calif.
Delaware State Board of Game and Fish Commissioners, Dover, Del.
Montana State Planning Board, Helena, Mont.
New Jersey State Museum, Trenton, N.J.
Oklahoma Geological Survey, Norman, Okla.
Oregon State System of Higher Education, Dept. of Higher Education, Dept. of Visual Instruction, Corvallis, Ore.
Tennessee State Department of Conservation, 310 State Office Building, Nashville, Tenn.
Wisconsin State Department of Public Instruction, Madison, Wis.

WAR MAPS: MATERIALS FOR IMPROVING MAP READING SKILLS IN THE JUNIOR HIGH SCHOOL

KENNETH A. FULLER
Boynton Junior High School
Ithaca, New York

Teachers can not overlook opportunities for the discussion of contemporary affairs in their proper relationship to regular classroom activities. We can promote the development of desirable and permanent basic skills by making use of the voluminous current materials available. One means is by using war maps in periodicals, current event weeklies, and newspapers to improve map reading and interpretation. By utilizing these materials in the classroom, the teacher may set up comparatively simple exercises which lead to systematic instruction and a resulting increase of pupil comprehension.

It is trite to say that maps should be used constantly. Of course, newspaper and magazine maps can not supersede textbook maps, wall maps and other types of maps, but they can be valuable supplements. Places mentioned in current events can be studied and information retained because they are of immediate and vital interest. While the pupils become aware of changing geography and the world wide importance of well known and commonly unheard of places, specific map skills can be taught in an interesting and challenging manner.

Skills basic to map reading include the correct use of the scale of miles, the understanding of direction, and the knowledge and recognition of geographic features. Each skill will have to be broken down, the degree depending upon the ability and experience of the individual. To answer the question: "Which direction is Darwin from Singapore?" the student would first have to locate Darwin and Singapore, as well as know the general directions of north, northeast, east, southeast, south, southwest, west and northwest. He would have to read the question correctly to understand that the direction asked for is Darwin *from* Singapore and not from Darwin to Singapore.

A good map can tell a complete story. Newspaper and magazine maps showing possible military moves, certain actions and developments are not static as maps in the texts. We realize the importance

of inculcating the values of democracy, and the responsibilities and duties we share. Perhaps geopolitical maps will awaken those few who do not know that the world is continually shrinking. Maps wisely used have potential power in strengthening attitudes.[1] To realize this possibility, we must learn how to read and how to interpret the modern map.

A casual survey shows a variety of data given in news maps. An analysis of some newspapers, read frequently by pupils,[2] shows the following types of information presented, the more common data being: mileage given between places; land and water, distinguished either by light or dark color; numbers which are referred to below the map; political features; strategic cities; countries; inset maps; key; and a scale of miles. The less common facts are: title of area; size of map; latitude and longitude; clock and time insets; indexed maps; naval, air, and army bases; physical features; four main directions; colored areas; type of projection; and time zones. It would be very helpful if the pupil knew that about seventy miles equals one degree of latitude and that fifteen degrees of longitude represents an hour of difference in sun time. The teacher should stress that the scale of miles can not be used everywhere on some maps of large areas. Simple and clear war maps provide information which allows for the recognition of changes as they occur. A number of *Social Education*[3] describes useful maps, giving the prices and the companies sponsoring the various type maps.

Probable Difficulties of Using War Maps in the Classroom

The first criticism likely to be made relative to the use of war maps as aids in improving map skills is that every pupil will not have the same map with which to work. It should be possible for the class to bring a certain issue of the local paper or a current events weekly which contains a map. However, a variety of maps will provide the class with more types and a wider range of place locations. This will result in more individual pupil work and more effort on the part of the teacher given to the correct reading of maps. Nevertheless, questions and activities common to most of the maps can be given. Examples of this are: state the title of your

[1] H. W. Weigert, Maps Are Weapons, *Survey Graphic*, October, 1941, 30:528-530.

[2] C. C. Harvey and Cecil F. Denton, *School Review*, March, 1938, 46:199.

[3] William H. Hartley, Sight and Sound in Social Studies, *Social Education*, February, 1942, 6:89-90.

map; name the continent it is on or near; locate this area on a map in your textbook; measure the distance between any two cities; name the rivers, cities and islands shown; and the importance of the area to the world today.

Renner's[4] reasons why maps are neglected may apply in this instance as obstacles in the use of current event maps. He states that their role is generally misunderstood; most teachers have not been trained in their proper use; most people mistakenly believe that a map is something solely geographical in character rather than an educational instrument; and that maps possess so many faults. The limited survey mentioned above illustrates the divers data given on war maps. There are many symbols given, altho there is a lack of uniformity in their use. The nature of the medium of publication prevents the grading of the maps, which is a desirable project.

Another point of which to be aware is the tendency for one to think he has located a place when he has found it without determining its position on the earth's surface. The study of the countries and cities in the news with respect to one's own position, whether it be Ithaca, New York, or Dubuque, Iowa will help to overcome this weakness as will the continual use of a globe. Then, too, as Collins[5] proved, the ability of pupils to supply correct answers to a geographical description of a location does not ascertain whether they can locate the place accurately upon a map. Conversely, the pupil's ability to make a correct location upon a map does not guarantee that he can answer correctly to a description of the particular place.

Junior High School pupils have difficulty in seeing a given area as a part of the whole. Suggestions for pupil activities below will help to minimize this weakness.

These difficulties are mentioned not to discourage the use of war maps but to call attention to obstacles sometimes overlooked in teaching pupils to use maps.

SUGGESTIONS FOR TEACHER'S USE

The utility of any map is determined by the pupil's ability to interpret the various symbols on the map as well as their relation-

[4] George T. Renner, Educational Revision of Wall Maps, JOURNAL OF GEOGRAPHY, January, 1941, 40:13.

[5] A. W. Collins, Pupil Comprehension of Place Location in High School United States History, JOURNAL OF GEOGRAPHY, November, 1939, 38:329.

ship to one another. It is dependent upon the pupil's ability to know and to use many individual skills necessary for successful map reading. Teachers in schools which use the "Iowa Every Pupil Tests of Basic Skills, Test B," or J. Wayne Wrightstone's "Co-operative Test of Social Studies Abilities" can use the results of their pupils' performance on the map section. An investigation of the individual's responses will point out certain general weaknesses, which the teacher can attempt to remedy while using maps of the present war. Most of the questions on these tests do not attempt to diagnose the difficulties involved in interpretation.

The teacher should make certain that the seventh graders select the simplest maps that are printed. After essential location facts are learned, it is advisable to let them use more complex maps. Other facts that should be taken into account by the teacher include the clearness of the map print, the size of the scale, the usefulness of factual material, the presence of as few facts as possible, the key, and the value to your classroom work.

The following questions can be used diagnostically or in an achievement test. The teacher should expect numerous difficulties involved in the answers. They are based on a newspaper map of the Far East. A teacher desiring to use them can insert the names of different places in each question to facilitate use for another map area.

I. For teacher's use

A. Use of scale of miles

1. How many miles is it from the left side of the map to the right side—directly along the equator?
2. What is the straight-line distance from Batavia to Darwin?
3. How far would you have to travel by plane to go from Singapore to Manila?
4. What is the straight-line distance from Rangoon to Manila?
5. How many times would you have to travel from Ithaca, N.Y. to Elmira, N.Y. to go one thousand miles?
6. Which would be the longer trip by airplane—from Chungking to Batavia or from Sidney to Calcutta?
7. Which is closest to the equator—Darwin, Singapore or New Delhi?

B. Understanding of directions
   8. Which direction is north on your map?
   9. What ocean is west of Australia?
   10. Which direction is Darwin from Singapore?
   11. Going from Calcutta to Batavia by plane, you would be travelling in which direction?
   12. Which continent is north of Borneo?
   13. What is the general directon of flow of the Irrawaddy River?
   14. Which ocean is south of India?

C. Knowledge of geographical terms
   15. Is Darwin located on an island or a continent?
   16. Which island is the largest of the Dutch East Indies?
   17. Is Calcutta located at the source or near one of the mouths of the Ganges River?
   18. Is a strait a land mass or body of water?
   19. What island lies off the south coast of India?
   20. Is the body of water lying east of India a cape, bay, gulf, or ocean?
   21. On what extension of land are the Malay States located?
   22. What city is on the delta of the Ganges River?

D. Drawing conclusions
   23. Which city is farthest above sea level—Rangoon or Mandalay?
   24. What products would be exported from Melbourne?
   25. What type of climate would you expect in Calcutta at this time of year?
   26. Why are there few railroads in Borneo?
   27. What products would you find in Java?
   28. In going north from Rangoon on the river would you be travelling north or south?
   29. What season is it in Canberra, when it is December in Ithaca?
   30. What time is it in Manila if it is 2 P.M. in Singapore?

E. Other questions, if map has an extensive key
   31. What is the approximate population of Calcutta?
   32. Are there many more railroads in Indo-China than in India?
   33. What cities does the Burma Road connect?
   34. Which city is larger—Bombay or Calcutta?

35. How far above sea level is the northern section of Burma?

II. A list of suggestions for student use

A. Bulletin board displays

1. Mount the map on a sheet of white paper so that a large margin remains. In the margin put geographical terms with their definitions, and draw a line from term to the respective locations on the news map. For example, "Island—a tract of land surrounded by water"; then draw a line to an island on the map.
2. Exhibit a series of maps of the same area with different scales.
3. Place a large map on the bulletin board. Take news maps showing certain areas enlarged and extend a ribbon or string from them to the corresponding places on the large map.
4. Arrange a series of maps telling a story, such as political change.
5. Place a large map on the bulletin board. Select pictures of persons, places, things or events and extend a ribbon or string from them to the corresponding places on the large map.
6. Students make symbols for products and paste on a large current events map.
7. Display different types of newspaper and magazine maps.
8. Student committee place news maps on bulletin board and have them attach below a list of questions such as "Which way does River A flow?" "What country borders C on the North?"

B. Instructional games

1. Game: How many facts can I tell about my map? An example would be, Manila is northeast of Singapore.
2. Quiz contest on "Where is this?" Student gives news facts of a place location and other students answer. This should be followed by location on wall map or text map.
3. Students mount maps and attach questions about their maps. Exchange with other students and correct each other's answers.

4. Students sketch from memory the outline of an island or country studied. With no names on the sketched map, see who can identify area. Later, fill in names of locations.
5. Spell down on the names of cities, countries, personages studied while discussing war maps.

C. Collect in notebook maps which relate to regular units being studied.

D. Use as a basis for coloring outline maps.

CONCLUSION

The presence of at least one map in the daily newspapers and a series of maps in Sunday editions, in addition to maps in almost every issue of current event sheets, as well as those in picture and news magazines makes war maps readily available.

This type of visual aid material gives teachers another timely and important instructional tool, which will increase the pupils' knowledge of specific skills in map reading.

In using these maps in current event and regular class content work, the pupils' map interests may increase: at least, there will be a greater awareness of the maps in the news publications. The teacher will keep up-to-date with the fast moving affairs and will develop a wider basis for sound interpretations of world happenings. Map reading skills would increase with directed instruction.

War maps provide a source for individual activities and instructional material for display. In addition to increasing our knowledge of map facts and improving our map reading facility, the use of war maps may be developed into a strong propaganda medium for our democratic front.

A MAN WHO URGED THE NATION TO PLANT MORE TREES: J. STERLING MORTON—FOUNDER OF ARBOR DAY—1832-1902*

MAMIE L. ANDERZHON
Oak Park, Illinois

"Love of Home is Primary Patriotism.
Other Holidays Repose Upon the Past.
Arbor Day Proposes for the Future."

These are the words of J. Sterling Morton enscribed on the curved bench back of the Morton Memorial Monument, State Park, Nebraska City, Nebraska. At the beginning of the twentieth century children all over the United States brought their pennies and nickels to school for the Memorial Fund. Many of the children earned the money themselves.

Rudolph Evans designed and executed the Memorial in bronze. By 1905, it was completed and ready to be unveiled. Ex-president Cleveland, in whose Cabinet Mr. Morton had served as Secretary of Agriculture, delivered the dedication address.

The Memorial Monument stands in a natural bowl near the entrance to the Park. Surrounded by native oaks, maples, elms, and ash, the bronze statue towers from a plaza into an immediate background of pines. In front of Mr. Morton, another bronze statue, a wood nymph, the Spirit of Arbor Day holds her sapling.

Mr. Morton, the founder of Arbor Day, visualized what groves of trees would do for the treeless grassy plains. Being an enterprising newspaper editor, he used his paper to encourage people to plant forest and fruit trees. He wrote many editorials suggesting that everybody make the planting of trees an annual habit. Like many dreams the idea for planting trees grew in the minds of other people. They acted and planted millions of trees in the Great Plains. Of course many did not grow. Others have died, some have been winter killed, or withered in the drought. But these early settlers, who dug into the sod each spring to set out more and more trees and shrubs, are the people who hand on to us the fruits of their patient efforts. Some of the state legislatures have chosen the date of Mr. Morton's birth, April 22, to be observed as Arbor Day.

* Sources for material in this paper were obtained at Arbor Lodge, Nebraska City, Nebraska and the Nebraska City Public Library File of newspapers, published by Mr. Morton.

THE WESTWARD TREK

The Morton ancestry dates back to the Puritan days, before 1668, when Richard Morton, a blacksmith by trade, is reported to have settled in Hartford, Conecticut; and later moved up the Connecticut valley to Hadley, Massachusetts; and thence to Hatfield, Massachusetts.

Each time that Richard Morton moved farther inland, he found more farmers, and people in the villages who needed his blacksmithing work. He shod horses, and repaired the pioneers' wagons. Men and their families enroute in Conestoga wagons to the unsettled valley, stopped at his shop to have the heavy iron tires on the wheels reset so that they could withstand the tough travels ahead. These first pioneers blazed new paths and forded streams. Their only roads were the trails they made for themselves.

But Richard's great grandson, Abner, did not choose to spend his life hammering and shaping horseshoes on the anvil. Attending Dartmouth College, he was graduated in 1799, and joined those who sought the freedom of the frontier. He moved to St. Albans, Vermont where his son Julius was born.

Julius Morton, father of J. Sterling Morton lived in Vermont until he married Emeline Sterling. He took his bride and moved west to Adams, in Jefferson County, New York where J. Sterling Morton was born, April 22, 1832.

The father, Julius Morton was "considered a man of marked ability, and having fine business capacity and sound judgment." Like his ancestors before him, Julius Morton saw the chances for getting ahead and making money in the Old Northwest. In 1834, he and his wife and young son, Sterling, moved into the Michigan Territory, three years before Michigan came into the Union as a state.

MOVING WITH THE FRONTIER

Young Sterling liked to play in the woods surrounding his home in Michigan. Always on the alert, he used his eyes to see what he could see, and his ears to hear. He knew where to find the first flowers in spring, and when to listen that he might hear the call of some shy bird. Not often did animals in the forest fool him with their maze of tracks. Early in life he caught nature's lesson in democracy. With each year he felt the winter thaw into the life of spring; spring bloom into summer; summer ripen into autumn harvest; and then the fields at rest under winter's blanket of snow.

Appreciating the value and discipline of the mind a formal education afforded, Sterling attended school in Albion, Michigan. He was interested in what people thought. Young Morton had a flare for putting ideas into words for others. Taking advantage of this gift, he sought to prepare himself for journalism at the University of Michigan and Union College, New York.

In the home of David French in Detroit, Michigan, October 30, 1854, at the age of twenty-one, he married Caroline Joy French. They had been engaged for seven years.

Filled with the spirit of adventure and the urge to explore, Morton and his bride, a year younger than himself, set out for the West on their wedding day. Just as his ancestors he left the established home of his youth and looked to the frontier in the West. Mr. Morton had a little money. He had his education and preparation for journalism. He was alert and observing, ambitious and unafraid of work.

The young couple went by rail from Chicago to Alton, Illinois. The coach in which they rode was little more than what we might consider a box-car with seats, pulled by an engine that puffed out black soot and cinders which the wind blew into the coaches. From Alton they steamed down the Mississippi river on a boat to St. Louis, where they took another river boat up the Missouri river to St. Joseph, Missouri. The captain always had to be on the lookout for snags and sandbars as the boat moved leisurely thru the muddy waters. At St. Joseph they took a stage coach. Jolting in and out of the bluffs and over the rolling hills of the fertile Missouri valley they arrived at Council Bluffs, Iowa. The entire trip took seven full days and nights. Days and nights that smarted with the venture that was hard, tedious, and fatiguing.

Helping to Build a Community

After crossing the Missouri River, they stopped at Bellvue, Nebraska Territory, where Colonel Peter A. Sarpy, a representative from the American Fur Company had a fur trading post. Sarpy bought furs from the Omaha, Osage, Pawnee and Sioux tribes. A Presbyterian Mission was also established here to convert the Indians.

Near Bellvue, Mr. Morton built their first home, a log cabin of two rooms. Nestled among the oaks, their cabin was enfolded in autumn's golden and russet dress. From their cabin they looked

across the muddy Missouri River to the yellow and crimson covered Iowa bluffs. Below the bluff, where their cabin stood, were the tepees of their closest neighbors, the Omaha Indians.

The enterprising young man cast about the country during the winter. He looked into the future but was not unmindful of this land's heritage. Here he stood on land first owned by the Indians. Once great herds of buffaloes had roamed over this ground. This land France had claimed until Napoleon sold it to the United States. Uncle Sam was just completing final treaties with the Indians. Mr. Morton found the homesite near Nebraska City. The next year, after securing a "squatter's right," which meant he had the privilege of entering upon the land after the government survey, he took the necessary steps to legally claim the land. The patent to the land was granted to J. S. Morton, May 1, 1860, after the completion of the payment of $1.25 per acre. James Buchanan, President of the United States, signed the patent. This original document now hangs in Arbor Lodge library.

Mr. and Mrs. Morton set out with determination to build a home for themselves in the Nebraska Territory. When they arrived in 1854 less than six months had passed since the Indians had ceded the title of the territory to the United States. Into this vacant country unoccupied by white people, except for the trappers and hunters, the young couple ventured.

The struggle that accompanies adventure, and the growth that spells romance followed the young man and his bride. Into the rugged life of the frontier they had chosen to come. The Mortons weathered the hard winter of 1857. Snow was the deepest ever known. From December to the March thaw Indians as well as the scattered white settlers and their animals perished in the blizzards. Today "Old Timers" still speak of the winter of '57 as the "ninety days of solid blocks." The Mortons adjusted and adapted their ways of living to the frontier life; life on the Great Plains untried. They brought with them their culture. This they transplanted into their new homes. Mrs. Morton had her art and music. Mr. Morton had his ability to see opportunities, and had the foresight to see how to make the most of them for himself and his community. They built their home on virgin land; land where houses were as yet unbuilt and grain for food not yet sown. They became the leaders. Leaders who helped to lay a foundation for a community soon to be born. The imprint of their efforts makes up a part of the "Warp" into which is woven the institutions of the community.

What they said and did started precedents and is a part of the moral and political fabric for those who followed.

The spring Mr. and Mrs. Morton moved to Nebraska City they built a four-room frame house, with a wide front porch. In contrast to the other houses sprinkled over the prairies and hills this home was like a mansion. It is said to have been the only shingled structure between Nebraska City and the Rocky Mountains in 1855. They planted flowers, shrubs, vines, and an orchard, as well as forest trees. Arbor Lodge represents one of the earliest attempts at home landscaping on the Great Plains. Mr. and Mrs. Morton remodeled and enlarged their home twice during their lifetime. The original timbers of the first home are still in use today. When Arbor Lodge became the property of the late Joy Morton, the Lodge was again enlarged to its present fifty-two room Colonial structure, which is the present historical museum.

Natural and Human Resources Combine into Community Enterprises

Mr. Morton had considered the opportunities that awaited a newspaper editor on the frontier. By 1856 he was editing the *News* the only newspaper in the Nebraska Territory. From the North, East, West, and South he gathered news; and then scattered it again to the four winds. In these early days Mr. Morton once wrote, "A man with some mind and muscle can deposit eight quarts of Indian corn in a well plowed acre of Otoe County land, and by reasonable careful cultivation, and the co-operation of sunbeams and raindrops, gather in the autumn anywhere from fifty to eighty bushels of cereal, from the same acre and have the land left." Thru his paper Mr. Morton challenged people into thinking what position they should take towards local and national issues. Editing his paper during the heat of the Civil War and clamor for internal improvements that brought better transportation into the West, he often mellowed issues by presenting the problems of sections other than where he lived.

In addition to editing the *News,* Mr. Morton served as Territorial Secretary of the Nebrska Territory from 1856 to 1857; and acted as governor a part of this time. He was a man of strong convictions and chose to be an unsuccessful candidate in politics rather than waver from what he considered to be right. As a democrat he opposed the "silver-tongued" William Jennings Bryan on Free Silver.

Many of the Indian Tribes had not ceeded their lands to the government when the Kansas-Nebraska Bill, 1854, was passed and the Nebraska Territory was organized. In 1857 near Arbor Lodge the Table Creek Treaty was signed between the Pawnee Indians and General J. W. Denver.

In 1854, the Board of Education requisitioned the Nebraska City Council for $15,000 in bonds to be used for the erection of a high school. Money was scarce. Interest rates were high. People needed their meager funds to pay for their land, livestock, seeds, and implements. Mr. Morton bought $13,000 of the bonds at an interest rate of 10 per cent, a rate of interest not uncommon in those days. Mrs. Morton and the other women of the City held a festival and raised $1,110 towards the remaining fund.

The Spirit of Arbor Day

Mr. Morton deplored the fact that Nebraska was almost treeless. The destruction of timber was becoming more and more widespread. So in 1873, thru his own efforts and the action of the State Board of Agriculture, he was able to have "one day in each year set apart as a perpetual Arbor Day to be devoted thruout the State to the planting of forest and fruit trees."

Mrs. Morton joined in her husband's enthusiasm for promoting the Arbor Day Spirit. Near the front of the Lodge stands an Englemann Spruce. In 1878, she carried it from Pike's Peak as a seedling in a tomato can. She traveled by stage coach.

Today, we may walk down the path away from the Lodge that leads to the rose arbor and fish pool. We pass a sun dial that bears this inscription, "Hours Fly, Flowers Die; New Day, New Way; Love Stays."

More Frontiers

The four Morton sons, Joy, Paul, Mark, and Carl caught the spark of enthusiasm for life and followed thru the pioneering days to success in industrial adventures.

Early in life Joy Morton, the eldest son saw that altho the settlers on the Great Plains found water, soil, grass, and they could plant trees, both men and beasts had to have salt. While his father was busy with the responsibilities that come with the duties of service in public life such as Secretary of Agriculture in President Cleveland's Cabinet and serving on the Nebraska Board of Agriculture, Joy Morton looked into the future. He saw the

possibilities for a great salt industry in Chicago. Salt, a product that people needed and had to buy. So the Morton salt refinery was established in Chicago, the meat-butchering city for the United States. But salt is another story, except that near Chicago at Lisle, Illinois, is another Morton Arboretum of some four hundred acres, the gift of the late Joy Morton, son of J. Sterling Morton, Founder of Arbor Day.

THE USES AND PRODUCTION OF TUNG OIL

GEORGE CASS DE LONG
Jacksonville, Illinois, High School

Tung oil has been known and used in China for over sixty centuries for ship-caulking and as an ingredient in Chinese lacquers, but it was not introduced into the United States until 1869.[1] Its use was quite limited until during the World War when its values were first recognized. Since then its versatility has brought it recognition as a valuable and useful natural product.

Tung oil is the fastest drying oil known. A drying oil is one that makes substances with which it is mixed non-absorbent, completely repellent to water. Thus the addition of tung oil to certain organic and inorganic compounds and rosins gives quick-drying power to varnish and the ability to absorb oxygen and form a hard protective film that is resistant to boiling water, freezing, and former whitening effects.[2]

The general availability of tung oil in quantities commensurate with our growing needs served to heighten its value in spite of certain drawbacks, and in the opinion of a leading chemist its production has completely revolutionized paint and varnish manufacture.[3] By 1939 American manufacturers were relying upon it as their major drying oil.

How Tung Is Used

Despite the earlier use of tung for lacquer, it was not used in

[1] Phillips, M. O.: Florida's Infant Industry, *Economic Geography*, vol. V, October, 1929, pp. 348-357.

[2] Pulsifer, L. Valentine: The Romance of Valspar. Valentine & Co.

[3] Gardner, H. A., and Butler, Paul H.: Tung Oil Culture. National Paint, Varnish. and Lacquer Association, Inc. Washington, June, 1937, p. 8.

paints in this country until 1936. In that year a new kind of paint, whose basal mixture consisted of 45 per cent soy and 55 per cent tung oil, was introduced. Thus in discovering a new use for soy oil the paint industry also broadened the use of tung oil. The addition of soy oil keeps tung from solidifying at a relatively low temperature and prevents destructive distillation that occurs when it is used alone.[4]

The modern auto is most grateful to tung. Cheaper but better paint and filler jobs, improved gaskets, high grade brake linings, enameled surfaces, shellac, and bakelite and plastic fittings often depend upon it. Linoleum and oilcloth makers likewise tip their hats to it, while numerous other things, some of them vital to defense, have been improved with its addition. Raincoats, shower curtains, and balloon coverings now shed water because of tung treatment, and shot cartridges withstand wetting to a greater degree than before. Even a rubber substitute has been developed which is composed basically of tung.

Timber-poor China has long employed whatever means possible to prolong the life of paper and wood. It is tung oil that the Chinese have used to water-proof their buildings and writing materials,[5] to line their junks, as an important constituent in their varnishes, lacquers, paints, and japanning processes, and to give permanence to their masonry.[6]

Certainly the extensive use of tung has been a bonanza to American, European, and Chinese manufacturers and has improved the appearance of office, home, and barn.

WHERE TUNG GROWS

Whereas tung is indigenous to various parts of Malaysia, Africa, and certain Pacific islands, China has long been the chief producer and exporter. In commercial circles and in parlance common to those acquainted with the oil it has been called china-wood oil. The term is a misnomer. It is not a product of the wood, but is the oil extracted or expressed from the fruit of the tung tree. The word *tung* is Chinese for *heart,* and the leaf of the most important species of the family to which tung belongs is heart-shaped; hence the name. The tree is brittle and is usually covered with a

[4] Anonymous: Tung Oil's Marriage to Soybean, *Review of Reviews,* vol. XCIV, September, 1936, p. 4.

[5] Phillips: *Op. cit.,* p. 348.

[6] Gardner and Butler: *Op. cit.,* p. 2.

maze of beautiful bell-shaped, generally pink or white, entomophilous blossoms, which precede the leaves.

In as much as tung is sensitive to cold weather, it thrives only in tropical and subtropical regions. In China, *Aleurites fordii,* the chief species, is important in four provinces, Szechwan, Hunan, Hupeh, and Chekiang, while *montana* species does best in tropical Kwangsi province, west of Canton.

United States Welcomes Tung

It seems that the first seeds to produce tung trees in America were imported from China in 1905. In that year the United States Department of Agriculture received nuts from Consul-General Wilcox of Hankow. The Experiment Station at Chico, California, presumably planted them at once.[7] Concurrently Dr. David Fairchild, in charge of the Division of Plant Introduction of the United States Department of Agriculture, became actively interested and thru his efforts plantings were made in Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.[8] By 1909 a government contingent was optimistically investigating tung conditions in China.

To the enthusiasm and experimental work of the late William H. Raynes, a well-known horticulturist of Tallahassee, Florida, is due much of the credit for the early developments of the tung oil tree in Florida, and that state leads in the promotion and interests of tung growth in the United States. From Raynes' one successful tree the first grove of commercial importance in the United States originated.[9]

With the favorable reports of the government "spies" who had investigated the growth of tung in China, expansion in the South appeared to far-sighted individuals a just and profitable venture. Both the Bureau of Chemistry and Soils and the Bureau of Plant Industry have assisted in the expansion of tung groves and production thru many experiments, while state and local agencies have been devoting much attention to the production of tung crops as an economic policy.

The first extraction of American oil that was sufficient to at-

[7] Newell, Wilmon, et al.: The Tung Oil Tree. University of Florida Experiment Station, Gainesville; Bull. no. 280, June, 1935, p. 26.

[8] Concannon, C. C.: Tung Oil Blue Book, USDC Bureau of Foreign and Domestic Commerce, Washington, 1938, p. 3.

[9] Gardner, H. A. and Butler, Paul H.: *Op. cit.,* p. 30.

tract commercial interests took place in January, 1929. As the extracting machine was installed near Gainesville, Florida, and the golden oil was pressed out, nationally known manufacturers, representatives of internationally powerful financiers, chemists, agriculturists, scientific workers, and many curious and interested laymen looked on. Since then extracting mills have been established at numerous places in the Tung Belt. The Belt extends along the Gulf from eastern Texas to central Florida, a strip of territory generally not exceeding 100 to 125 miles in width.[10]

Thus far tung production in the United States has been negligible compared to the huge amounts China has contributed, the 11,000,000 pounds produced here prior to 1941 being 1.5 per cent of the amount imported during those years. Yet the decade of the thirties showed a remarkable increase from practically nothing to 4,000,000 pounds produced in 1940. In 1939 there were over 12,500,000 trees in the United States, one-third of them bearing. This number is constantly increasing.[11]

Imports into the United States increased steadily from 1914 to 1937, amounting in that year to 175,000,000 pounds,[12] valued at $25,000,000 (U.S.). But since then the Chinese Incident has greatly curtailed Chinese exports which have finally been entirely cut off. Meanwhile, American production is far from sufficient to supply recent demands. But on the optimistic side there are three noteworthy facts: that American oil is of much higher quality than Chinese and hence goes farther; that the mixture of tung oil with certain other lesser-quality oils now produces very excellent drying results; and, that our production is increasing.

Therefore, it appears logical that the United States will continue its efforts at becoming self-sufficient whether China rises again as a great exporter or not. After cessation of the war China will have to try to undersell the United States and must produce better oil if it is to compete with us. Tung has definitely had a setback because of the war, but it may emerge in a healthier, cheaper, and more stable condition if and when our South provides our needs, which according to some tung authorities may be as early as 1947.

[10] Concannon, C. C.: *Op. cit.*, p. 5.

[11] Dickey, R. D.: Personal communication.

[12] Inspectorate General of Customs (China): Foreign Trade of China, Maritime Customs (export volumes only), volumes covering years 1913 to 1939 inclusive.

GROWTH OF THE LARGER CITIES IN THE UNITED STATES 1930-1940

CHAUNCY D. HARRIS
The University of Nebraska

Cities in the United States had shown consistent and rapid growth for many decades before 1930, but the Census of 1940 revealed that during the decade 1930-1940 many cities actually lost population. This apparent loss was due in part to the wide-spread depression, but it was also due in part to a marked suburban trend. Thus in 36 metropolitan districts, the central cities showed decreases in population, but in only 8 of them was there a decrease

TABLE 1. FREQUENCY TABLE. PERCENTAGE INCREASE IN POPULATION 1930–1940 METROPOLITAN DISTRICTS BY REGIONS

Increase 1930–40	Region				U. S.
	East	Middle-west	South	West	
More than 20%	1	2	13	6	22
10.0–19.9%	3	8	16	3	30
5.0– 9.9%	9	16	6	4	35
0.0– 4.9%	13	24	1	0	38
Decrease	5	2	0	1	8
No data	0	0	5	2	7
Total number	31	52	41	16	140
Median % increase	3.3	5.0	16.8	13.6	7.3

for the metropolitan district as a whole.[1] Comparable figures for 1930 and 1940 are available for only 133 of the 140 metropolitan districts.

During the decade 1930-1940 the number of people in these metropolitan districts increased 8.2%, and the average rate of increase was 10.8%.[2] Altho the population in metropolitan districts increased at a slightly faster rate than the total urban population

[1] Figures in this paper have been calculated from press releases of the U. S. Bureau of the Census, Sixteenth Census of the United States: 1940, Series PH-1, Nos. 1-140 and summary, released at various dates between February 13, 1941 and June 11, 1942.

[2] In the former cities are weighted by size, in the latter all cities are given equal weight. In the former the total numerical increase 1930-1940 is divided by the total 1930 population of the same metropolitan districts. In the latter the percentages of increase for each city are added and divided by the number of cities. The medians in Tables 1 and 5 are found by ranging the cities in each group in order of rate of increase and taking the figure for the middle city.

(7.9%) or the total national population (7.2%), the rate of increase was lower than in previous decades, during which the large cities grew much faster than the country. The number of cities increasing at various rates is shown in Table 1 and Figure 1. Twenty-two cities increased by more than 20%.

The rate of growth of cities exhibited marked regional variation. Table 1 and Figure 1 show that most of the cities which grew rapidly were in the South or West. Less than one-fifth of the cities in the East or Middlewest showed rates of increase of more than

Fig. 1. Percentage Increase in Population in Metropolitan Districts, 1930-1940.

10%, whereas more than four-fifths of the cities in the South grew at this rate. Among the notable increases in the South were Houston with 50.5% (the highest of any city over 300,000 population), Miami with 89.5% (the highest of any city over 100,000), and Corpus Christi with 106.5% (the highest of any metropolitan district, Table 2). All sizes and types of cities grew rapidly in the South and West, where the average rates of increase were 21.8% and 16.9% respectively compared to 6.3% for the Middlewest and 5.3% for the East (Table 3).[3] Of the twelve states in which in-

[3] The percentage increase in number of people in the metropolitan districts for which figures are available for 1930 and 1940 was 19.7% for the South, 18.2% for the West and 5.4% for both the Middlewest and the East (cf. footnote 2).

TABLE 2. METROPOLITAN DISTRICTS WITH MORE THAN 25% INCREASE IN POPULATION 1930–1940

	% increase	Population, 1940
1. Corpus Christi, Texas	106.5	70,677
2. Miami, Fla.	89.5	250,537
3. Houston, Texas	50.5	510,397
4. Washington, D.C.	46.2	907,816
5. San Diego, Cal.	41.6	256,368
6. Jacksonville, Fla.	31.5	195,619
7. Shreveport, La.	30.4	112,225
8. Jackson, Miss.	28.9	88,003
9. Stockton, Cal.	28.2	79,337
10. Charleston, W. Va.	26.0	136,332
11. Los Angeles, Cal.	25.3	2,904,596
12. Sacramento, Cal.	25.2	158,999
13. San Jose, Cal.	25.1	129,367

creases in population in metropolitan districts were more than 15%, 8 were in the South, 2 on the border of the South and 2 in the West. In spite of high percentage gains, Southern states showed only moderate numerical gains; the chief urban centers still lie in the East and Middlewest.

In most parts of the country, the rate of growth of cities was about the same as for the total population. Regional differences in the rate of growth of cities thus reflect chiefly regional differences in the general increase in population. In 19 of the 39 states with available figures on metropolitan districts, the percentage increase in population of metropolitan districts differed less than 2% from that in the state as a whole. In California and New York, for example, the two states with the largest absolute increase in popula-

TABLE 3. AVERAGE PERCENTAGE INCREASE IN POPULATION. METROPOLITAN DISTRICTS, 1930–1940, BY REGIONS AND FUNCTIONAL TYPES*

Functional type	Region				U. S.
	East	Middle-west	South	West	
Resort	−1.9	—	48.8	41.6	34.4
Retail	—	6.8	46.6	16.9	28.2
Political	18.3	12.7	18.1	25.2	16.0
Transportation	3.3	1.1	17.7	—	13.2
Wholesaling	0	4.4	16.4	11.4	12.1
Diversified	6.4	5.4	21.0	14.1	11.8
Manufacturing	4.2	5.2	13.7	15.7	6.1
Mining	−3.5	—	—	—	−3.5
All types	5.3	6.3	21.8	16.9	10.8

* Each metropolitan district is given equal weight regardless of size.

tion in metropolitan districts, the percentage increases were 0.2% less and 0.9% more than for the total population of the respective states. In the Southeast, however, the cities grew even more rapidly than the population as a whole, and in the drought states, cities continued to grow despite sharp decreases in the rural areas. In Iowa, also, the cities grew much more rapidly than the whole population, but in the Pacific Northwest they grew more slowly.

Differences in growth among cities of different functional types, altho important, are not as consistent or striking as the regional differences (Table 3).[4]

Resort cities showed the highest average rate of increase (34.4%). Miami increased 89.5%, San Diego 41.6%, and Phoenix

TABLE 4. METROPOLITAN DISTRICTS WITH INCREASES IN POPULATION OF MORE THAN 100,000 DURING 1930–1940

Metropolitan District	Increase	
	Number	Per cent
1. New York, N.Y.	789,096	7.2
2. Los Angeles, Cal.	586,070	25.3
3. Washington, D.C.	286,757	46.2
4. Detroit, Mich.	191,103	9.1
5. Houston, Texas	171,181	50.5
6. San Francisco, Cal.	138,431	10.7
7. Chicago, Ill.	134,371	3.1
8. Miami, Fla.	118,348	89.5

36.0% (city only), but Asheville grew slowly compared to other Southern cities, and Atlantic City decreased in size.

Retail centers also grew rapidly (28.2%), but this is partly because they are located almost solely in the South and West, where all cities grew rapidly. Corpus Christi has already been noted. Shreveport, Stockton, and Fresno also showed rapid growth (30.4%, 28.7%, and 24.8%).

Political centers, averaging 16% increase in population, grew less rapidly than resort or retail centers but displayed consistent growth in all parts of the nation. Washington, D.C., with a rate of increase of 46.2% grew more rapidly than any other political center, or any city in the East or Middlewest or any city in the country of the same size. Southern and Western capitals, such as Jackson, Montgomery, Austin, and Sacramento, showed large in-

[4] For lists of the cities of various functional types consult: Chauncy D. Harris, "A Functional Classification of Cities in the United States," *Geographical Review, in press.*

creases. In the Middlewest, Charleston, Madison, Des Moines, and Lansing, with increases of 26.0%, 21.8%, 14.3%, and 11.8%, were among the few centers in this region with increases of more than 10%. In the East, Harrisburg with 7.2% was one of the few cities with more than a 5% increase.

Transportation centers showed moderate growth (13.2%) varying from substantial increases averaging 21.1% for Southern ports, and 9.2% for Southern railroad centers to a decrease of 0.1% for Altoona, the northern rail center.

TABLE 5. MEDIAN PER CENT INCREASE IN POPULATION OF METROPOLITAN DISTRICTS BY SIZE GROUPS, 1930–1940

Cities with population	Middlewestern cities, all types	Manufacturing cities, all regions	All metropolitan districts
Over 1,000,000	3.1	2.0	5.8
500,000–1,000,000	4.5	4.5	6.6
300,000–500,000	4.8	0.9	7.0
200,000–300,000	5.0	5.2	8.6
100,000–200,000	5.3	6.1	7.2
50,000–100,000	6.2	6.1	11.0
All sizes	5.0	4.8	7.3

Wholesaling centers and diversified cities also showed moderate growth (12.1% and 11.8%); differences in rate of growth followed closely general regional differences. Altho the rate of growth in such centers was not remarkable, the numerical increases were large. New York, Los Angeles, Houston, San Francisco, and Chicago of these groups include five of the seven cities with largest numerical increases (Table 4).

Manufacturing cities with an average of 6.1% showed below average growth in all regions and in cities of all sizes, largely because of the depression, but partly because of the declining relative importance of manufacturing in the occupational structure of the country. The trend has recently been reversed by the armament boom. Of the 19 industrial cities with more than 300,000 population, none increased by as much as 10% and only four at rates of more than 5% (Detroit, Louisville, Milwaukee, and Hartford). Among 42 smaller industrial cities only 12 showed increases of more than 10%.[5]

[5] Wilmington 15.5% and Binghamton 11.7% in the East; Waterloo 17.5%, Evansville 15.0%, Davenport-Rock Island-Moline 13.3%, and Peoria 12.3% in the Middlewest; Durham 19.1%, Greensboro 15.1%, Chattanooga 14.6%, Winston-Salem 12.9%, and Knoxville 11.9% in the South and San Jose 25.1% in the West.

The one mining center large enough to be a metropolitan district (Scranton-Wilkes-Barre) decreased in population (—3.5%).

Size appears to have had less influence than either regional location or functional type in the rate of growth of metropolitan districts 1930-1940. That the small centers grew somewhat more rapidly, however, is shown by Table 5 and by the fact that the average rate of growth of all metropolitan districts was 8.2% if cities were weighted by size, but 10.8% if the small cities were given equal weight with large cities (see footnote 2). Among regions only the Middlewest and among functional types only industrial cities had enough cities to show the trend. Among cities with more than a million Los Angeles showed remarkable growth for so large a city (25.3%) and San Francisco, Baltimore, Detroit, and New York showed significant increases (10.7%, 10.3%, 9.1%, and 7.2%).

ANNUAL MEETING
NATIONAL COUNCIL GEOGRAPHY TEACHERS

The Twenty-ninth Annual meeting of the National Council of Geography Teachers will be held at Ohio State University, Columbus, Ohio, on December 30, 31, 1942, and January 1, 1943. The Association of American Geographers will hold its meeting at the same place on December 28-30, 1942. Both organizations will be guests of the Geography Department of Ohio State University. Professor Guy-Harold Smith is in charge of local arrangements.

Hotel Headquarters will be in the Deshler-Wallick Hotel. Single rooms may be secured ranging from $3.00 to $7.00; double rooms range from $5.00 to $10.00. Large capacity rooms accommodating 4 to 10 persons are from $2.00 to $2.50 per person depending upon the number of occupants per room. The Annual Banquet ticket is $2.00, this includes such items as tips, flowers, decorations, and tax.

THOMAS F. BARTON, *Secretary*
Southern Illinois Normal University
Carbondale, Illinois

EDITORIAL NOTES AND NEWS

The National Council for the Social Studies holds its meeting in New York City, November 26 to 28. George Renner will discuss "The New Geography." Ben Wood and Hall Bartlett will discuss "Social Education for the Air Age." A panel discussion on "The New Geography" will be conducted by J. R. Whitaker, W. R. McConnell, Edwin Reeder, Kathryn Schnorrenberg, and Clarence F. Jones.

Foreign Commerce Weekly, United States Department of Commerce publication, features articles dealing with strategic and critical war materials of value to geography students. Several of these articles were briefly annotated in the spring bulletin of the Geography Club of Western Pennsylvania, of which Zoe A. Thralls was editor.

The Association of Pacific Coast Geographers held its annual meeting last June in Salt Lake City in conjunction with the Western Division, American Association for the Advancement of Science. The following officers were elected: Eliot Mears, president; John B. Appleton, vice-president; J. W. Hoover, secretary-treasurer; John Leighly and H. F. Raup, editorial board.

Some years ago a number of Rocky Mountain goats were brought to South Dakota for exhibition. Two of them escaped to the Black Hills. Now their progeny numbers 25, according to Forest Service. These animals were formerly confined to Washington, Montana, and Idaho.

We may not have to rely on Peru for vanadium if the reports are true that a large commercial production can be recovered from processing Idaho's phosphate rock.

Some of our armed forces are learning how to build a dome-shaped snow house in Eskimo style, just in case they might have to spend a night on a snowy expanse in the Arctic.

The Office of War Information discloses the fact that two million board feet of balsa wood will be available in 1943. A kiln for drying this light, strong wood for life boats and planes has recently been set up in Ecuador. Balsa saplings grow very rapidly.

DR. ROLLIN ATWOOD of the University of Florida, is serving as economic analyst at Quito, Ecuador, for the United States Department of State.